International Journal of Applied
And Natural Sciences (IJANS)
ISSN(P): 2319-4014; ISSN(E): 2319-4022
Vol. 5, Issue 3, Apr - May 2016; 19-22

International Academy of Science,
Engineering and Technology
Connecting Researchers; Nurturing Innovations

A REVIEW DIFFERENT TYPES OF FUNCTIONAL FOODS AND THEIR HEALTH BENEFITS

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ABSTRACT

Certain foods or food components may provide health and wellness benefits. These foods, also known as "functional foods," are thought to provide benefits beyond basic nutrition and may play a role in reducing or minimizing the risk of certain diseases and other health conditions. Examples of these foods include fruits and vegetables, whole grains, fortified foods and beverages and some dietary supplements. Functional characteristics of many traditional foods are being discovered and studied, while new food products are being developed to include beneficial components. By knowing which foods can provide specific health benefits, you can make food and beverage choices that allow you to take greater control of your health. In these paper different types of functional foods and their characteristics, composition and their uses and applications, Nutrient enrichment of food products, Functional Foods and their nutritional significance and health benefits are reviewed.

KEYWORDS: Food Components May Provide Health and Wellness Benefits

INTRODUCTION

Functional foods can be considered to be those whole, fortified, enriched or enhanced foods that provide health benefits beyond the provision of essential nutrients (e.g., vitamins and minerals), when they are consumed at efficacious levels as part of a varied diet on a regular basis. The concept of functional foods was introduced in 1980 by Japanese to regulate the use of food for medicinal purposes. Recently, the research was started to isolate or purify the food from some specific bioactive compounds called "Nutraceuticals" that are generally sold in medicinal form not associated and demonstrated to physiological benefits (or) provide protection against chronic diseases. Functional foods play important role in promoting health and reducing health risks. Functional foods may be defined as those with a traditional counter past, while nutraceuticals are those derived from different edible source but consumed in medical form like tablets or capsules or pills. Nutraceuticals can be prepared from chemical synthesis, fermentation and genetic engineering. They include a range of agri-food ingredients or Photochemical extracted from edible plants or animal products. The functional foods also known as designer foods medical foods, fortified foods, nutritional foods, nutraceutical foods, therapeutic foods and healthy foods. Consumer interest in the relationship between diet and health has increased the demand for information about functional foods.

Types of Snack Bars Composition and Their Uses and Applications

Food bars are snack foods of good sensory characteristics due to their constituents, contributing rich contents of

protein, lipids and carbohydrates. The development of food bars can be carried out through blending the grains, nuts and other ingredients along with some binding material like gums, liquid glucose or sucrose etc. The mixture is then shaped into a bar by passing through a roller or baked in a baking oven at moderate heat i.e. below 150°C (Brisske *et al*., 2004).

Most of consumers prefer cereal bars which contain chocolate but these are not healthier than whole grain plain cereal bars (Boustani and Mitchell 1990). Chemical analysis shows that cereal bars are marginally better than favourite traditional snacks on the basis of their sugar, fat, salt and fibre contents (Boustani and Mitchell, 1990).

The popular varieties of food bars include nutrition, energy, nutraceutical and diet bars. The snack bars with good nutritional value could play an important role in the physical and mental development of children and teenagers since they show a great preference for them. A soft golden baked crust breakfast bar made with wheat, whole-grain and fruit filling is a popular breakfast cereal made from oats, corn, and wheat. Grain based bars contain a source of fibre, iron, low saturated fat and iron (Rabort Larson, 2006).

Walnuts can successfully be used in the manufacture of snack bars as these offer good nutritional and sensory quality and remain stable in storage. Six snack-type bars were manufactured, to contain oat and wheat germ and two different walnut levels, agglutinated with natural sweeteners and fats. Two bars additionally contained toasted amaranth with brown sugar cover and wheat extrudate, while two others, contained puffed instead of toasted amaranth. The drying time for the cereal and walnut based bars was 45 min at 120°C. All bars presented a good fibre supply and the bar containing only oat, wheat germ and walnut, had high protein content. Sensory evaluation revealed that the bars with 18% walnut level got greatest preference. During storage, the moisture and water activity decreased in all the bars. Peroxides remained within the acceptable ranges; acceptability based on sensory evaluation was preferable in the bar with toasted amaranth (Estevez *et al.,* 1995). Joanne salvin (2004) in an epidemiological study reported that whole-grain intake is protective against cancer, CVD, diabetes, and obesity. Despite recommendations to consume three servings of whole grains daily, usual intake is low. Whole grains are rich in nutrients and phyto chemicals with known health benefits. These grains have high concentrations of dietary fibre, resistant starch, and oligosaccharides are rich in antioxidants, trace minerals and phenolic compounds which have been linked to disease prevention.

Two varieties of chocolate coated soy-based candy bars with almonds and nuts were developed for sportsmen who need a higher protein intake. The ingredients used were isolated soy protein, texturized soy flour, milk solids, cocoa powder, toasted oat, nuts, almonds, authorized flavours, preservatives and antioxidants. The nutritional composition of both bar varieties averaged at 12.4% proteins, 9% lipids and 58.7% carbohydrates, and the mean calorific value was 375.2 kcal/100g (Penna *et al*., 1993).

Table 1: Basic Recipe for the Preparation of Grain Bar

Ingredient	Basic Recipe
Popped amaranth seeds	60g
Pumpkinseeds	7g
Sesame	5g
Tofu	10g
Ground nuts	5g
Jaggery	15g
Sugar	7g
Binding-agent	2g

Methodology for Preparation of Grain Bar

- Amaranth seeds are subjected for popping to prepare popped seeds.
- Sesame seeds, tofu, pumpkinseeds and groundnuts are coarsely powdered and mixed together.
- Jaggery is dissolved in hot water and strained.
- Powdered gum acacia is added to it and cooked to a soft ball stage.
- The mixture along with popping amaranth seeds are added to the cooked syrup and mixed thoroughly.
- The mixture is poured on pre greased surface and rolled out.
- It is allowed to set and then cut into shape of bar of ¾ cm thickness.
- The bars are then packed into LDPE, HDPE covers.
- These bars are stored at ambient temperature.

Table 2: Types of Bars

Name of the Bar	Ingredients Used	Uses	Reference
Cereal bar	Oats	Break fast	//www.dooyoo.co.uk/food/alpen-cereal-bars/reviews/
Fruit bars	Guava	Heart health, preventing the oxidation of cholesterol, reducing the risks of musculoskeletal problems and even helping eyesight.	Vijayanand, (2002)
Fruit & yogurt bars	Wheat flour, whole oats, yogurt powder	Reduce the chronic diseases.	www.preparedfoods.com
Lemon bars	Lemon	Reduce the cancers	www.nutrigrainbars.com
Multi grain bar	Wheat, oats, almonds	Reduce the cancers, heart diseases.	www.nutrigrainbars.com
Fermented sorghum bar	Fermented sorghum	Break fast	Ragini Sharma,(2007)
Fiber bar	Apple-Cinnamon	More fibre	www.Gardenoflife.com
Diabetic snack bar	Corn	Reduce the hyperglycemia	Lisa et al.,(2006)

Table 3: Formulation of Papaya Fruit Bar Using Phytosterol as Functional Ingredient

Ingredients used	Number of combinations			
	Control	T1	T2	T3
Papaya pulp	100g	100g	100g	100g
Sugar	20%	20%	20%	20%
Liquid glucose	10%	10%	10%	10%
Citric acid	0.3%	0.3%	0.3%	0.3%
Butter	For greasing	For greasing	For greasing	For greasing
Phytosterol powder	-	1.5g	2g	2.5g

Source: (Sailaja et al., 2014)

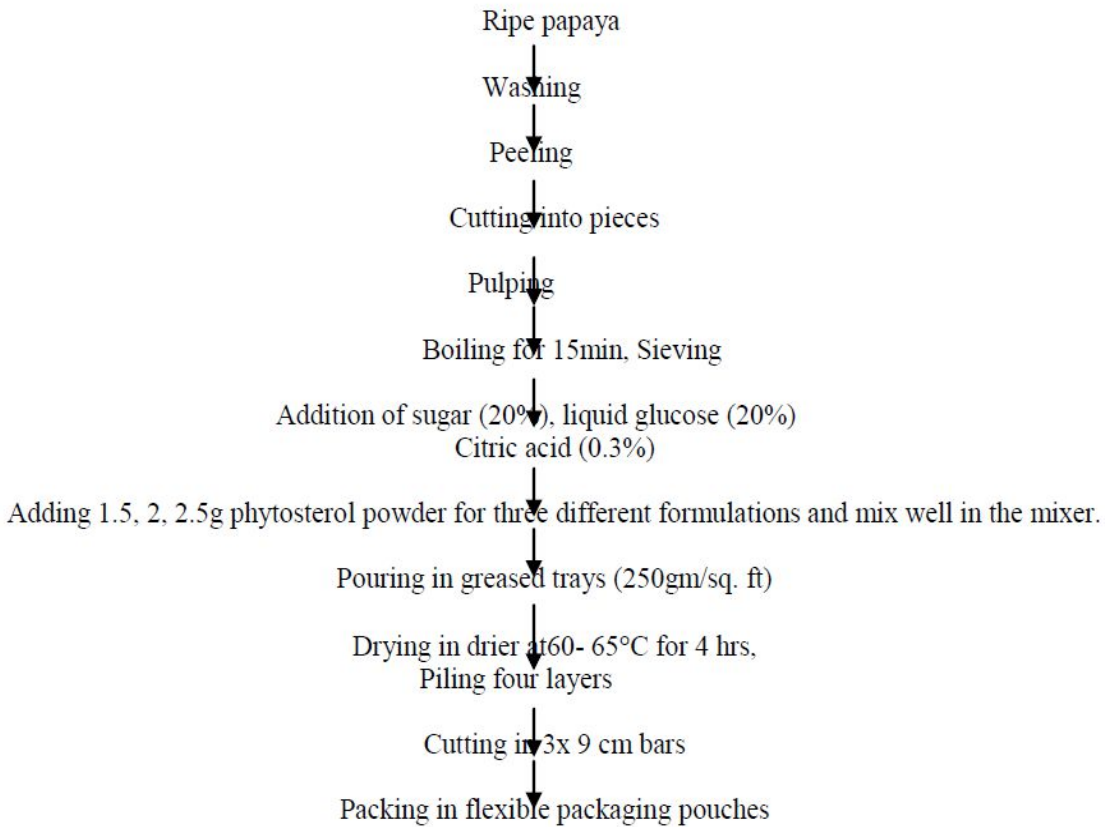

Figure 1: Preparation of Phytosterol Enriched Papaya Fruit Bar

NUTRIENT ENRICHMENT OF FOOD PRODUCTS

Mahesh *et al.* (2000) developed iron enriched cereal-pulse based food preparations where in green leafy vegetables (GLVs) were used for enrichment. The results revealed that enrichment with GLV considerably increased the soluble iron (ranging for 12 to 35.9%) content in all the food preparations. Ionizable iron was increased from 0.9 to 6.9% in the food preparations.

Mundra *et al*. (2000) evaluated the influence of 6 per cent incorporation of leaf concentrate, a commercial product prepared from variety of green leaves on anemic adolescent girls. Feeding with 6g- leaf concentrate to experimental group

for 3 months raised the hemoglobin levels from 11.5 to 13.0 g/dl.

Mani *et al.* (2000) studied the effect of supplementation of 5 per cent spray dried spirulina in corporate products on blood hemoglobin levels in young anemic girls for period of 30 days. A mean increase of 1.17 g/dl i.e.10.33 per cent in the blood hemoglobin levels was seen in the anemic subjects.

Sharma *et al*. (2001) studied the effect of wheat grass juice as dietary supplementation on anemic young women. The experimental group received wheat grass juice extracted from one bunch of wheat grass (edible portion 30 g) using 100 ml of water daily for 30 days. The mean rise in hemoglobin of 1.25g/dl was seen in experimental group.

Shakunthala (2002) reported that daily supplementation of lotus stem incorporated laddoo to the subjects for a period of 30 days brought about a significant improvement in hemoglobin levels.

Functional Foods and Their Nutritional Significance

Hardy *et al*. (2000) reported the term ''functional food'' itself was first used in Japan, in the1980s, for food products fortified with special constituents that possess advantageous physiological effects and health claims. Several functional foods have consistently demonstrated LDL-cholesterol-lowering effects. Significant interest has focused on dietary factors for the prevention of cardiovascular disease (CVD) (Mishra and Geetha 2009).

Functional foods have been developed in virtually all food categories. According to alternative classification some functional products (1) Improve the regular stomach and colon functions (pre- and probiotics) or ''improve children's life'' by supporting their learning capability and behaviour. (2) Functional food is designed for reducing an existing health risk problem such as high cholesterol, high blood pressure. (3) Lactose-free, gluten-free products (Ma kinen- Aakula, 2006).

In particular, new food products with health attributes have raised in popularity because they are believed to offer consumers an increased ability to reduce the risk of certain diseases (Dhar and Foltz 2005). The global market for functional foods is estimated to be worth about US$33 billion (Hilliam, 2000).

The soft drink segment include non-alcoholic beverages with vitamins or other enhanced ingredients; in the confectionery segments, innovations include chewing gum for dental hygiene, while omega-3 milk was an important functional food innovation in the dairy product sector; functional bakery products included breakfast cereals with cholesterol-lowering ingredients. Other product segments contribute to only 16% of new functional products compared with 41% of products innovations in the total food and drinks market (Menrad, 2003).

Willett (2002) reported that 60 per cent of the risk of chronic diseases potentially is preventable with lifestyle modifications, including changes in diet.

Von Alvensleben (2001) provides a useful schematic representation of the relative position of functional food.

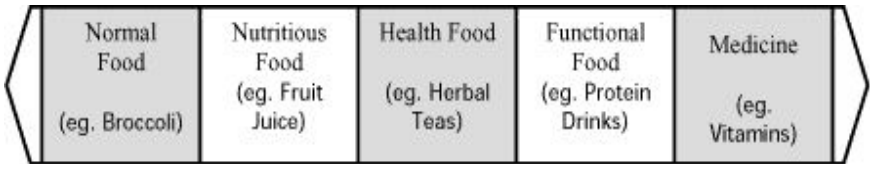

Table 4: Types of Functional Foods and HEALTH Benefits

Functional Food	Health Benefits
Fortified foods	
Juices with calcium	Reduce risk of osteoporosis, reduces hypertension.
Grains with folic acid	Reduce risk of heart diseases, neural tube birth defects
Enhanced foods	
Beverages and salad dressings with anti oxidants. Phytosterol enriched flavoured milk and phytosterol enriched fruit bar.	May support overall health. Especially it can be used for cholesterol reduction.
Whole foods	
Oats	Reduces cholesterol
Fruits and vegetables	Reduces risk of certain cancers and heart diseases

Kotilainen *et al*. (2006)

The members of the Institute of Food Technologists (IFT) recognize that the foods already on the market represent a small fraction of the potential for functional foods. Today's science and technology can be used to provide many additional functional foods, and future scientific and technological advances promise an even greater range of health benefits for consumers. Functional foods can provide health benefits by reducing the risk of chronic disease and enhancing the ability to manage chronic disease, thus improving the quality of life. Functional foods also can promote growth and development and enhance performance.

Table 5: Examples of Functional Food Components Currently Marketed

Functional Component	Health Benefits	U.S. Regulatory Status of Claims
Soluble oat fiber	Coronary heart disease	FDA approved health claim
Soy protein	Coronary heart disease	FDA approved health claim
Phytosterol/stanol esters	Coronary heart disease	FDA approved health claim
Calcium	Osteoporosis	FDA approved health claim
Folate-enriched foods	Neural tube defects	FDA approved health claim

Functional foods can be used to reduce the human diseases and because it contains functional ingredients which will have a functional properties like antimicrobial activity, antoxidant, anticancer.

Table 6: Examples of Functional Components

Class/Components	Source	Potential Benefit
Beta-carotene	Carrots, pumpkin, sweet potatoes, cantaloupe, spinach, tomatoes	Neutralizes free radicals which may damage cells; bolsters cellular antioxidant defenses; can be made into vitamin A in the body
Lutein, Zeaxanthin	kale, collards, spinach, corn, eggs, citrus fruits, asparagus, carrots, broccoli	Supports maintenance of eye health
Lycopene	Tomatoes and Processed Tomato products, Watermelon, red/pink grapefruit	Supports maintenance of prostate health
Insoluble fiber	Wheat bran, corn bran, fruit skins	Supports maintenance of digestive health; may reduce the risk of some types of cancer

Beta glucan	oat bran, oatmeal, oat flour, barley, rye	May reduce risk of coronary heart disease (CHD)
Soluble fiber	Psyllium seed husk, peas, beans, apples, citrus fruits	May reduce risk of CHD and some types of cancer
Sulforaphane	Cauliflower, broccoli, broccoli sprouts, Cabbage, kale, horseradish	May enhance detoxification of undesirable compounds; bolsters cellular antioxidant defenses
Flavanones – Hesperetin, Naringenin	Citrus fruits	Neutralizes free radicals which may damage cells; bolster cellular antioxidant defenses
Anthocyanins – Cyanidin, Pelargonidin, Delphinidin, Malvidin	Berries, cherries, red grapes	Bolster cellular antioxidant defenses; supports maintenance of healthy brain function.

Functional foods can take many forms. Some may be conventional foods with bioactive components that can now be identified and linked to positive health outcomes. Some may be fortified or enhanced foods, specifically created to reduce disease risk for a certain group of people. Consumers can already select from a wide spectrum of foods that contain functional components either inherently (e.g., soy protein, cranberries) or via fortification (e.g., folate-fortified foods). Health benefits may result from increasing the consumption of substances already part of an individual's diet or from adding new substances to an individual's diet. As additional bioactive components are identified, the opportunities for developing functional foods will be broad (O'Donnell, 2003). Foods that naturally provide a bioactive substance may be enhanced to increase the level present in the food (e.g., eggs with increased levels of omega-3 fatty acids). Alternately, foods that do not naturally contain a substance can be fortified to provide consumers with a broader selection of food sources for a particular component and its health benefit (e.g., calcium-fortified orange juice).

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